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(57) The invention relates to improvements in bolts, particularly to locking security bolts for use with doors, windows and the like and more particularly to a bolt which is unlocked by a mechanism located in an area remote from the bolt such that the bolt cannot be unlocked from outside the premises. The invention therefore provides a locking device 11 for a door, window or the like, comprising a movable locking bar 13, locking means for moving said locking bar from an unlocked to a locked position and unlocking means 12 located at a position remote from the locking bar operable to move the locking bar from a locked to an unlocked position. As shown the unlocking means acts from the bolt keeper to retract the bolt.

FIG. 1.

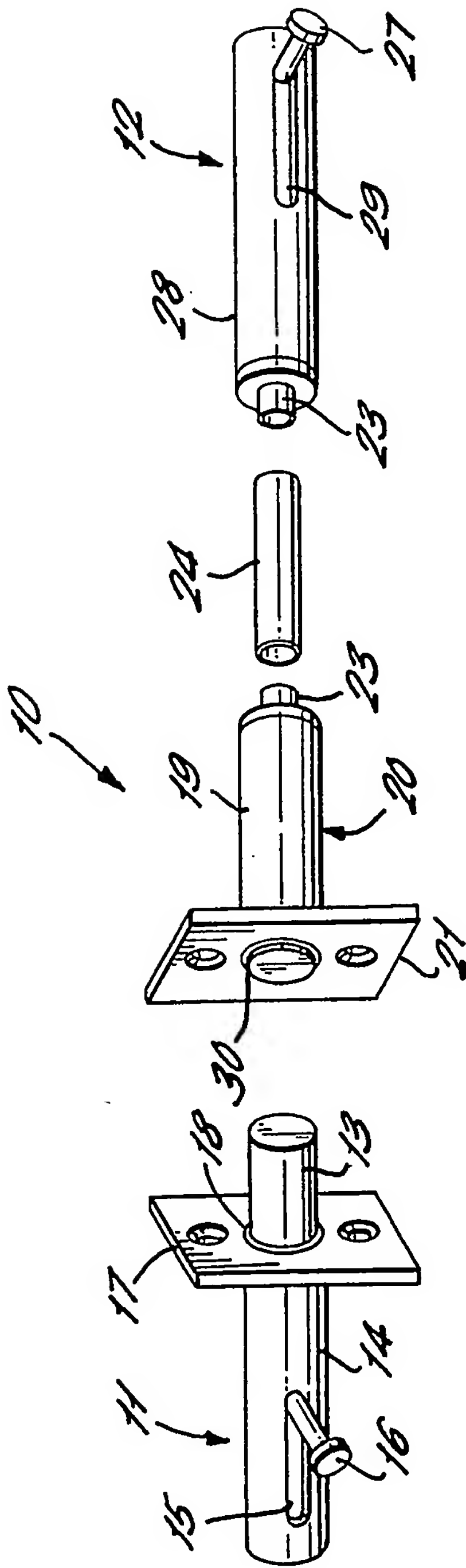


FIG. 2.

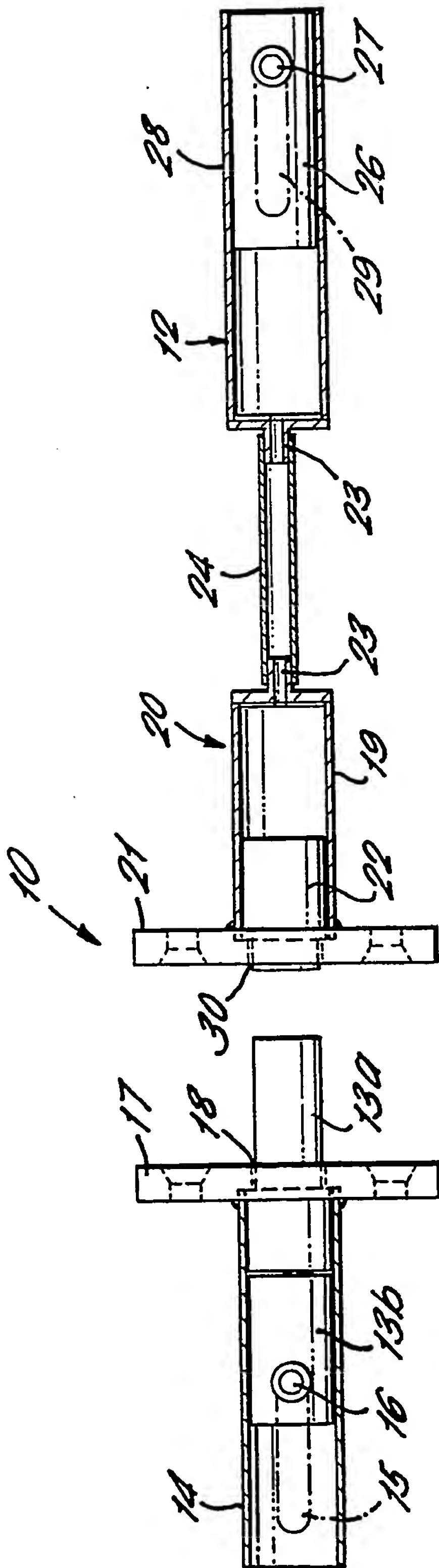


FIG. 3.

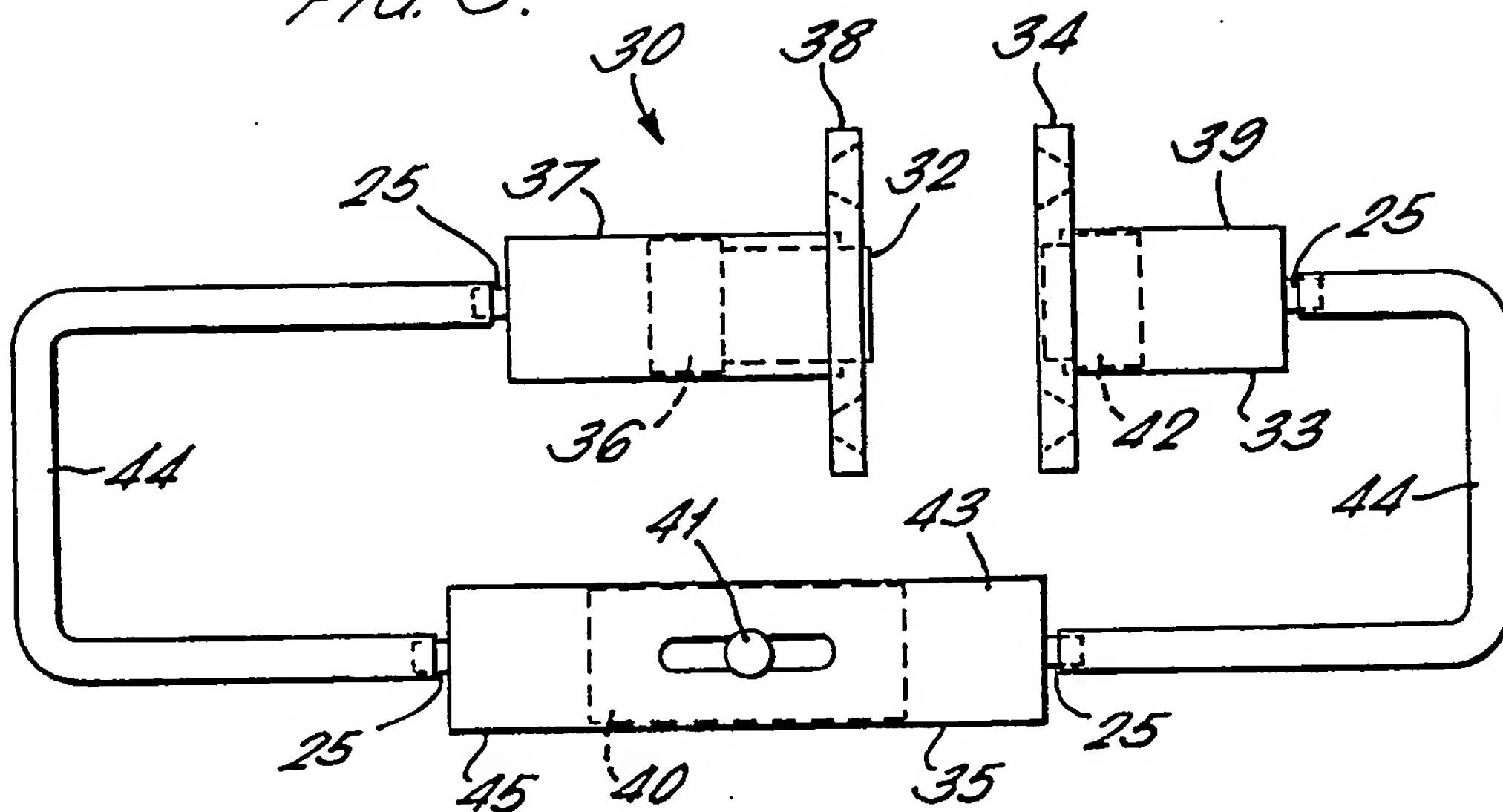


FIG. 4.

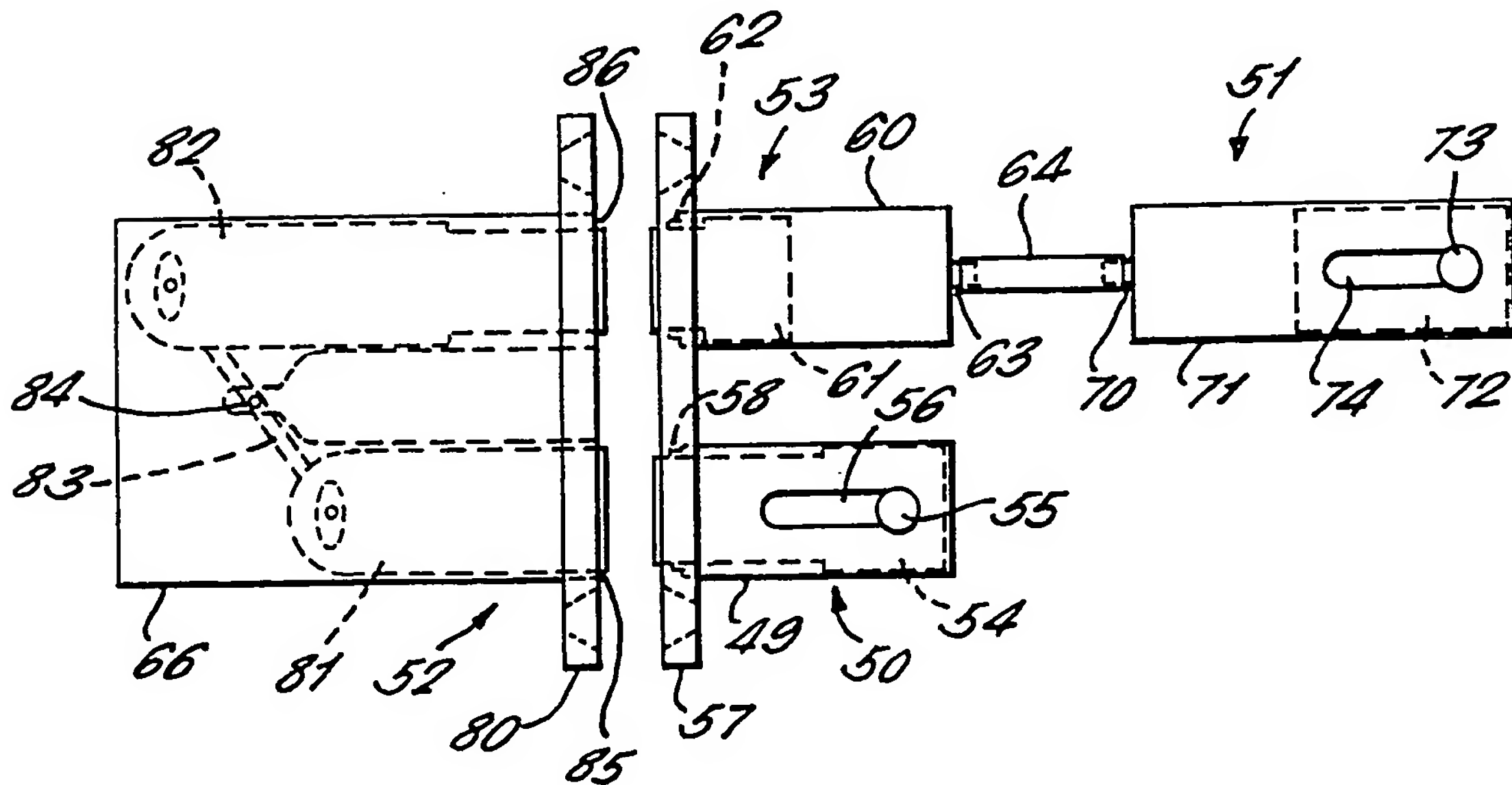


FIG. 5.

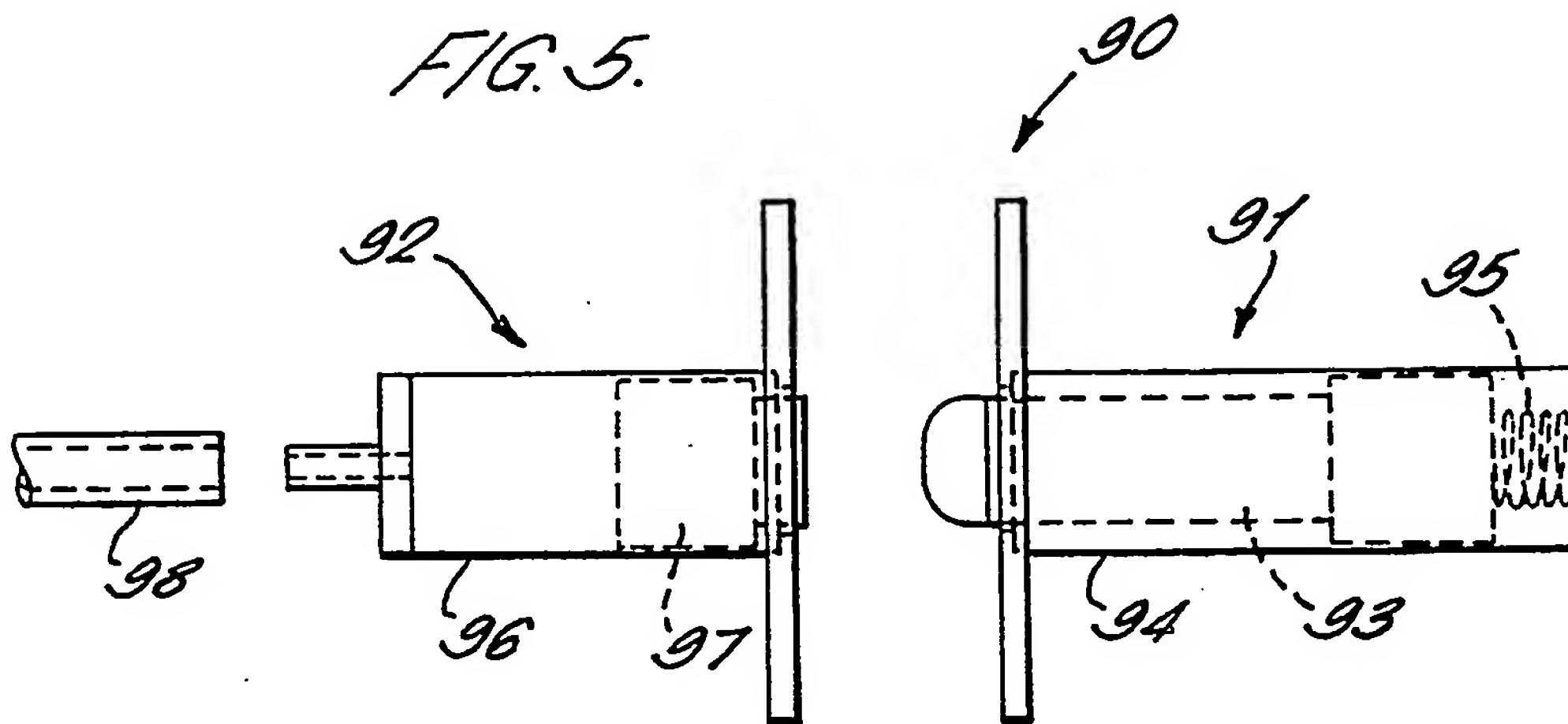
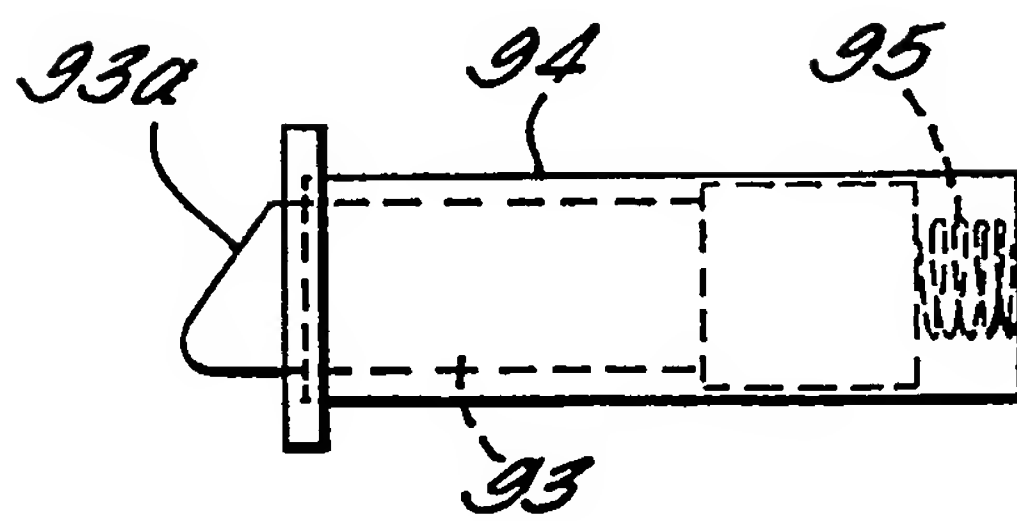


FIG. 6.



IMPROVEMENTS IN LOCKING DEVICES

The invention relates to improvements in locking devices such as locking security bolts or catches for use with doors, windows and the like.

Many existing locking devices, such as bolts and catches for doors, windows and the like incorporate a sliding element or locking bar which is positioned or locked by means of a key. This means that the mechanism that operates and locks the bolt or catch is located together with or forms a part of the bolt or catch itself. There are often only a limited number of keys available for such bolts or catches which a burglar or thief can easily obtain. The intruder can then relatively easily gain entry through the window or door by breaking a pane of glass to obtain access to the bolt or catch from outside the premises and unlocking it. Even if the intruder is unable to obtain a key, he may simply be able to break the lock on the bolt or catch to gain access.

Other problems occur with some existing locks on doors for trains and the like where safety is important. It has been known for catches to fail when the train is in motion, thus allowing the door to swing open.

One object of the present invention is to provide a locking device which can only be unlocked by a mechanism located in an area remote from the device such that the device cannot be unlocked at the device itself.

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According to the invention there is provided a

locking device for a door, window or the like,  
comprising a movable locking bar, locking means for  
moving said locking bar from an unlocked to a locked  
position and unlocking means located at a position  
5 remote from the locking bar operable to move the  
locking bar from a locked to an unlocked position.

Preferred embodiments of the invention will now  
be described, by way of example only, with reference  
10 to the accompanying drawings in which:-

Fig. 1 is a schematic representation of the  
separate elements of a bolt according to the  
invention;

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Fig. 2 is a side sectional elevation showing  
the bolt of Fig. 1 in further detail;

Fig. 3 is a side sectional elevation of an  
20 alternative bolt according to the invention;

Fig. 4 is a side sectional elevation of yet  
another alternative bolt according to the invention;

25 Fig. 5 is a side elevation of a catch according  
to the invention; and

Fig. 6 is a plan view of the locking bar of the  
catch of Fig. 5.

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Referring to Figs. 1 and 2 there is shown a  
bolt mechanism 10 for use in locking a window or door  
or the like (not shown). The bolt mechanism 10  
comprises a locking mechanism 11 and an unlocking  
35 mechanism 12. The locking mechanism 11 comprises a  
locking bar 13 which is slidable within a casing 14.

As can be seen from Fig. 2, the locking bar 13 is split to form two separate parts 13a, 13b. Bar part 13b has a constant diameter, whilst bar part 13a has a stepped diameter. The diameter of bar part 13a is reduced at its end which is remote from bar part 13b. In the casing 14 is a longitudinal slot 15 from which protrudes an arm 16 which is attached to locking bar part 13b. The casing 14 is fixed at one end to a flange 17. The flange 17 has screw holes therein for mounting the casing in, say, a door. The flange 17 also has an aperture 18 which allows passage of the locking bar 13, which aperture also has a stepped diameter. The profile of the aperture 18 corresponds to the profile of bar part 13a.

Mounted in a suitable position on, say, a door frame, to receive the locking bar 13 is a socket 20. The socket 20 has a casing 19 which is attached to a flange 21 for mounting purposes. Slidably located within the socket casing 19 is a piston 22. The piston 22 has a stepped diameter, the smaller portion of which points towards the flange end of the casing 19. The flange 21 also has an aperture 30 having a stepped diameter corresponding to the diameter of the piston 22, which allows the passage of said piston 22 and the locking bar 13. In the opposite end of the socket 20 to the flange 21 is a small duct 23 to which one end of a tube 24 may be attached. Contained within the casing 19 and separated from the aperture 30 by the piston 22 is an hydraulic fluid, such as oil or air. The tube 24 also contains hydraulic fluid.

The tube 24 connects the socket 20 to the unlocking mechanism 12. The unlocking mechanism 12 has a casing 28 and the other end of the tube 24 is



attached to another small duct 23 in one end of the casing 28. Located within the casing 28 of the unlocking mechanism 12 is a piston 26, to which is attached an arm 27. The arm 27 can move along a longitudinal slot 29 in the casing 28. The unlocking mechanism 12 is positioned in an area remote from the door, where it cannot be reached from the door itself.

To lock the bolt mechanism 10, the locking bar 13 is moved to the right by movement of the arm 16. It should be noted that references to the "right" and "left" here and subsequently are used for the purposes of referring to the drawings only. Obviously the mechanism may be reversed in use. Locking bar part 13a is thus moved across the gap between the door and door frame i.e. between flanges 17 and 21 and is received in socket 20. Although Figs. 1 and 2 show a relatively large gap between the flanges, this will not occur in practise as there is very little gap between a door/window and its frame. The gap is shown enlarged here for ease of reading the drawings. The bar part 13a is prevented from moving further when the stepped part of the bar part 13a meets the step in the aperture 18. This prevents the bar part 13a from falling out of the casing 14 and ensures that a sufficient length remains in the casing to give the strength required for its locking purpose. Bar part 13a simultaneously pushes the socket piston 22 to the right hand end of the socket casing 19 thus expelling the hydraulic fluid from the socket 20 into the tube 24. The fluid in the tube 24 enters the casing 28 of the unlocking mechanism 12, thus pushing the unlocking mechanism piston 26 to the right hand end of the casing 28.

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Subsequent movement of the locking arm 16

towards the left hand end of slot 15 only results in movement of bar part 13b only. Bar part 13a is unaffected and remains in the locked position in socket 20.

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To unlock the bolt mechanism 10, lever 27 is moved to the left hand end of slot 29, thus moving the locking piston 26 in the same direction. The fluid within the unlocking mechanism casing 28 is forced into the tube 24 and the fluid in the tube 24 re-enters the socket casing 19. The socket piston 22 is forced by the fluid to the left hand end of the socket casing 19, thereby pushing bar part 13a out of the socket 20. Further movement of the socket piston 22 is prevented when the stepped part of its profile meets the step in the aperture 30.

Fig. 3 illustrates an alternative embodiment of the bolt mechanism 30 in which the operating means for the locking and unlocking mechanisms are effectively combined in a single control unit 35. The control unit 35 can be located at a position remote from the bolt which is then invisible on both surfaces of the, say, door.

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As shown in Fig. 3, the locking mechanism 31 comprises a locking bar 36 located within a casing 37. The casing 37 is attached to a flange 38 which has a stepped aperture 32. The locking bar 36 has a stepped diameter which corresponds to the stepped aperture 32 of the flange 38.

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The socket 39 has a casing 33 and a flange 34, having a stepped aperture 43. Slidable within the casing 33 is a piston 42, which also has a stepped diameter.

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Socket 39 is hydraulically connected to one end of the control unit 35 by means of a tube 44. The locking mechanism casing 37 is hydraulically connected to an opposite end of the control unit 35 by means of duct 25 and a second tube 44.

Located within the casing 45 of the control unit 35 is a piston 40 to which is attached an arm 41. Movement of the arm 41, and thus the piston 40, to the left causes hydraulic fluid in the left hand end of the casing 45 to exit the casing 45 into the tube 44. The fluid within the tube 44 enters the locking mechanism casing 37, pushing the locking bar 36 to the locked position within socket 39. This pushes the socket piston 42 to the right and the hydraulic fluid in the right hand end of the casing 33 is expelled into tube 44. Movement of the arm 41 causes hydraulic fluid in the left hand end of the casing 45 to exit the casing 45 into the tube 44. The fluid within the tube 44 enters the locking mechanism casing 37 pushing the locking bar 36 to the locked position within socket 39. This pushes the socket piston 42 to the right and the hydraulic fluid in the right hand end of the casing 33 is expelled into tube 44. Movement of the arm 41 to the right will result in the expulsion of the locking bar 36 from the socket 39 effected by means of piston 42.

The locking mechanism and socket of the embodiment of the invention described in Fig. 3 are mounted on a door/window and the frame respectively or vice versa with the control unit located remotely and connected to both the socket and the locking mechanism.

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Fig. 4 illustrates another embodiment of the

invention in which the locking mechanism and the socket are both mounted on the door/window or both mounted on the frame. The bolt mechanism shown in Fig. 4 comprises a two part locking mechanism 50, 52 and an unlocking mechanism 51 with a socket 53. The first part 50 of the locking mechanism comprises a primary locking bar 54 having a stepped diameter, said bar 54 being slidable within the mechanism casing 49. Attached to the bar 54 is an arm 55 movable along a longitudinal slot 56 in the casing 49. One end of the casing 49 is attached to a flange 57. The flange 57 has a stepped aperture 58 which allows the passage of the primary locking bar 54.

Also attached to the flange 57, on the same face as the locking mechanism part 50, is a socket 53. The socket 53 comprises a casing 60 located within which is a piston 61, which has a stepped diameter. Where the socket 53 is attached to the flange 57, the flange 57 has another aperture 62 which is stepped to correspond to the diameter of the piston 61. At an opposite end of the socket casing 60 to the flange 57 is a duct 63 to which is attached one end of a tube 64. Hydraulic fluid is contained within the tube 64 and the casing 60, separated from the aperture 62 by means of piston 61.

The unlocking mechanism 51 has a casing 71, in one end of which is a duct 70, to which the tube 64 is connected at its other end thus joining the socket 53 and unlocking mechanism 51. Located within the casing 71 is an unlocking piston 72 to which is attached an arm 73. The arm is movable along a longitudinal slot 74 in the casing 71.

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The second part 52 of the unlocking mechanism

comprises a casing 66 attached to a second flange 80. Located within the casing 66 is a secondary locking bar 82 connected by a cross-bar 83 to a push rod 81. The cross-bar is pivotally hinged to the locking bar 82 and the push rod 81 and pivots about a fixed pivot point 84. The flange 80 also has two apertures 85, 86 therein. Aperture 85 allows the passage of the push rod 81 and the primary locking bar 54, whilst aperture 86 allows the passage of the secondary locking bar 82.

In use, the locking mechanism arm 55 is moved to the left causing the primary locking bar 54 to traverse the space between the flanges 57, 80 and enter the aperture 85 in the flange 80. The primary locking bar 54 pushes the push rod 81 to the left hand end of the casing 66, which in turn causes the secondary locking bar 82 to pivot forwards and through the aperture 86 in the flange 80. The secondary locking bar 82 traverses the gap between the flanges 57, 80 and enters the socket 53 by means of the aperture 62. This in turn forces the socket piston 61 towards the right hand end of the casing 60, thereby expelling the fluid from the casing 60. The fluid enters the tube 64 and flows along the tube 64 into the casing of the unlocking mechanism 51. This forces the unlocking piston 72 to move to the right hand end of the casing 71.

Movement of the arm 55 of the locking mechanism 50 towards the right will withdraw the primary locking bar 54 from the aperture 85 but will not affect the secondary locking bar 82. To withdraw the secondary locking bar 82, the unlocking mechanism 51 must be activated by means of the arm 73. Movement of the arm 73 to the left moves the unlocking piston

72 to the left, which in turn causes the fluid to push the socket piston 61 to the left. This in turn pushes the secondary locking bar 82 out of the socket 52 into the unlocked position.

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Although the invention has been described with reference to hydraulic operation, it is to be noted that any suitable alternative means of activation of the elements of the locking device may be employed. Some examples of alternatives include electrical, electronic, radio or other forms of remote control.

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The component parts of the locking devices are preferably of metal, such as steel, although any other suitable materials may be used. The tube may be of plastic or rubber.

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Where hydraulic fluid is employed, suitable seals must be used on all joints and appropriate tolerances used on all parts in contact with the fluid. Although air may be used, oil is the preferred hydraulic medium.

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The oil may alternatively be contained in a flexible rubber bag, which expands and contracts according to the pressure applied to the oil.

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The hydraulic connecting tubes, electrical wires or other necessary connecting means between the component parts of the locking mechanism can easily be hidden within the windows or doors themselves, their frames, skirting boards and the like, to give a neat and discrete system.

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The locking device according to the invention can also easily be adapted (particularly the

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embodiment shown in Fig. 3) to a multiple device application. The control unit 35 can be linked to a number of different locking devices on different windows and or doors for simultaneous locking and  
5 unlocking.

Referring now to Figs. 5 and 6, there is seen a catch 90 for the door of a train, car or the like. The catch 90 comprises a locking mechanism 91 and a  
10 socket 92. The locking mechanism 91 has a locking bar 93 which is slidable within a casing 94 and is biased outwardly by a spring 95 located in one end of the casing 94. The locking bar 93 is shaped with a sloping edge 93a. The socket 92 comprises a casing  
15 96, slidably located within which is a piston 97. One end of the socket 92 is connected by means of a tube 98 to an unlocking mechanism (not shown) of the type shown in Figs. 1 and 2.

20 In the unlocked condition, the piston 97 is biased towards the right (as shown in the drawing) by hydraulic pressure when the unlocking mechanism is activated. The piston 97 pushes the locking bar 93 out of the socket 92 against the bias of the spring  
25 95 into the casing 94 so that the door can freely be opened. To effect locking, the unlocking means is moved to the locked position, thus releasing the pressure on the piston 97. The spring 95 pushes the locking bar 93 to the left into the aperture of the  
30 socket 92, thereby forcing the piston 97 to move to the left in the casing 96. The hydraulic fluid is forced out of the casing 96 into the tube 98. The locking bar 93 remains in the locked position until the unlocking mechanism 91 is re-activated.

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This device can be used in a multiple form on,

say, a train, such that a single unlocking mechanism  
is activated by a guard remote from the doors to  
allow the doors to be opened and passengers to enter  
or exit. Before the train departs, the locking  
5 mechanism is activated by the guard to lock the doors.

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CLAIMS:

1. A locking device for a door, window or the like, comprising a movable locking bar, locking means  
5 for moving said locking bar from an unlocked to a locked position and unlocking means located at a position remote from the locking bar operable to move the locking bar from a locked to an unlocked position.
- 10 2. A locking device as claimed in claim 1 further comprising a socket for receiving one end of the locking bar when in its locked position.
- 15 3. A locking device as claimed in claim 2 further comprising a piston located within the socket, which is displaced by or to allow the entry of the locking bar into the socket.
- 20 4. A locking device as claimed in claim 3 in which the unlocking means are operable to move said socket piston to displace the locking bar from the socket.
- 25 5. A locking device as claimed in claim 4 in which the unlocking means comprise a piston located within a casing, the movement of which causes reciprocal movement of the socket piston.
- 30 6. A locking device as claimed in claim 5 in which the said socket piston and unlocking means piston are hydraulically connected.
- 35 7. A locking device as claimed in claim 6 further comprising an arm attached to the unlocking means piston, for effecting movement of said piston.
8. A locking device as claimed in any one of the

preceding claims in which the locking means comprise an arm attached to the said locking bar, the movement of which arm moves the locking bar from an unlocked to a locked position.

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9. A locking device as claimed in any one of the preceding claims in which the locking bar comprises two unconnected parts.

10 10. A locking device as claimed in claim 9 in which only one of the locking bar parts is attached to the movable arm.

11. A locking device as claimed in any one of  
15 claims 1 to 7 further comprising means for operating the locking means which are located at a position remote from the locking bar.

12. A locking device as claimed in claim 11 in  
20 which the means for operating the locking means and means for operating the unlocking means are integrated into a single control unit.

13. A locking device as claimed in claim 12 in  
25 which the control unit comprises a piston which is connected to move the locking bar and the socket piston, such that when the control unit piston is moved in one direction it causes the locking bar to move from the unlocked to the locked position, and  
30 when the control unit piston is moved in the other direction it causes the socket piston to push the locking bar from the socket from the locked to the unlocked position.

14. A locking device as claimed in any one of  
35 claims 1 to 7 in which the locking means comprise a

movable locking bar, to which is attached an arm,  
which locking bar when moved causes a second movable  
locking bar to move from an unlocked to a locked  
position, said unlocking means being operable to move  
5 said second locking bar from the locked to an  
unlocked position.

15. A locking device as claimed in any one of  
claims 1 to 7 in which the locking means comprise  
10 spring means biased to move the locking bar from an  
unlocked to a locked position.

16. A locking device as claimed in any one of the  
preceding claims in which the locking means further  
15 comprise means for moving the socket piston to allow  
entry of the locking bar into the socket.

17. A locking device as claimed in any one of the  
preceding claims in which the locking means are  
20 located on a door or window and the socket is located  
on a door or window frame or vice versa.

18. A locking device as claimed in any of claims 2  
to 13 in which the locking means and socket are both  
25 located on a door or window or both located on a door  
or window frame.

19. A locking system comprising a plurality of  
locking devices as claimed in any one of the  
30 preceding claims having mutual unlocking means.

20. A locking system as claimed in claim 19 in  
which the locking means and unlocking means are  
operable by a single control unit.  
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21. A door, window or the like having some elements

of a locking device as claimed in any one of the preceding claims incorporated therein.

22. A door, window or the like mounted in a frame,  
5 incorporating a locking device as claimed in any one of the preceding claims.

23. A locking device as hereinbefore described with  
reference to and as shown in the accompanying  
10 drawings.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

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9211036.0

**Relevant Technical fields**

(i) UK Cl (Edition K ) E2A: AEB, AMX

(ii) Int Cl (Edition 5 ) E05B

**Databases (see over)**

(i) UK Patent Office

(ii)

Search Examiner

P J SILVIE

Date of Search

28 JULY 1992

Documents considered relevant following a search in respect of claims

1-19, 22

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 0857948 A (NEWMAN)	1-4, 19, 22

Category	Identity of document and relevant passages	Relevant to claim(s)

### Categories of documents

X: Document indicating lack of novelty or of inventive step.

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